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First capture of *Diclidurus albus* Wied-Neuwied, 1820 (Mammalia, Chiroptera, Emballonuridae) from Nicaragua

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Abstract

We report on the first capture and photographs of the Northern Ghost Bat, *Diclidurus albus* Wied-Neuwied, 1820, from Nicaragua, based on one individual from the Reserva Silvestre Privada Refugio Bartola, department of Río San Juan, southeastern Nicaragua. We provide basic morphological measurements of the individual as well as a distribution map of previous visual sightings and acoustic recordings of this species from Nicaragua.

Key words

Lowland Wet Forest; Northern Ghost Bat; Refugio Bartola; mammal; Río San Juan.

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Introduction

The Northern Ghost Bat, *Diclidurus albus* Wied-Neuwied, 1820, is an uncommon, solitary, medium-sized, aerial insectivorous white bat that is distributed from Nayarit, Mexico to eastern Brazil, from sea level to 1,700 m a.s.l. (Ceballos and Medellín 1988, Moscoso and Tirira 2009, Lim et al. 2016). It flies high in open areas and in the forest canopy and is therefore very seldom-caught using mist nets (Ceballos and Medellín 1988, Reid 2009). It roosts under palm or banana fronds and on tree trunks (McCarthy 1987, Rodriguez-Herrera et al. 2007, Pedrosa Ferreira et al. 2013) and prefers humid habitats such as riparian and tropical rainforests, although it has also been found in human-disturbed areas such as plantations, clearings, and villages (Ceballos and Medellín 1988, Moscoso and Tirira 2009). Two subspecies are currently recognized for this species (Ceballos and Medellin 1988): *Diclidurus albus albus* Wied-Neuwied, 1820, distributed in the southern portion of its range, and *D. a. virgo* Thomas, 1903, occurring from Ecuador, Colombia, Venezuela, and the island of Trinidad, northwards.

Gray (1844) recorded 1 specimen of *Diclidurus albus*, as *D. freyreisii* Wied-Neuwied, 1821, a junior synonym of *D. albus* (Alston 1879, Carter and Dolan 1978), from "Pueblo Nuevo, Central America" (stored at the British Museum of National History, today the Natural History Museum, London, voucher number BMNH 1842.10.30.1; skin and skull; Fig. 1). The locality of this specimen was later changed to "South America" by Dobson (1878), and redefined to "Pueblo Nuevo, Nicaragua" by Alston (1879). Thereafter, Pueblo Nuevo was considered to be

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Figure 1. *Diclidurus albus* (BMNH 1842.10.30.1) from "Costa Rica, comunidad de Pueblo Nuevo, cerca del río Térraba" (see text). Photograph by L. Tomsett, copyright Trustees of the Natural History Museum, UK.

in Nicaragua until 2010 (see below) and all Nicaraguan records of this species during this period (i.e., Alston 1879, Allen 1910, Jones et al. 1971, Ojasti and Linares 1971, Baker and Jones 1975, Jones and Owen 1986, Ceballos and Medellin 1988, Martínez Sánchez 2000, Reid 2009) are based on this specimen alone. Medina-Fitoria et al. (2010) and Medina-Fitoria (2013, 2014) later recorded other visual sightings and acoustic recordings of *D. albus* from the 4 Nicaraguan departments of Atlántico Sur, León, Managua, and Rivas.

Medina-Fitoria et al. (2010) also redefined the locality of BMNH 1842.10.30.1 from "Pueblo Nuevo, Nicaragua" to "Costa Rica, comunidad de Pueblo Nuevo, cerca del río Térraba (08°58′ N, 083°32′ W)" without further argumentation. Herein we justify this action. Gray (1844: 26) reported that BMNH 1842.10.30.1 "was caught by Mr. Barclay, the botanical collector who accompanied the Voyage [H.M.S. *Sulphur*], on the 27th of March 1837, at Pueblo Nuevo in Central America." However, on March 27 1837, the *Sulphur* and its crew were still in Costa Rica and that very same day resumed sailing from Puerto Cortéz, close to where Pueblo Nuevo, near río Térraba, is located, north along the Costa Rican coast, and did not anchor until April 4, 1837 offshore at Isla El Cardón (12°28′ N, 087°12′ W), Nicaragua [T. McCarthy, pers. comm. to A. Medina-Fitoria 2010].

Therefore, *Diclidurus albus* has never been collected in Nicaragua and no photographs or voucher specimens have been ever provided from the country (Medina-Fitoria et al. 2010, Medina-Fitoria 2014). Here we report on the first captured and photographed individual of the Northern Ghost Bat, *D. albus*, from Nicaragua.

Methods

The bat was collected and photographed during an opportunistic find in the Reserva Silvestre Privada Refugio Bartola, Departamento de Río San Juan, southeastern Nicaragua, which lies within one of Central America's largest expanses of pristine Lowland Wet Forest (Holdridge 1967). The specimen's identification was verified with the use of the dichotomous keys and descriptions provided by Reid (2009) and Medina-Fitoria (2014). We followed Reid (2009) for the selection of morphological characters, which were measured with the use of standard calipers and a 100 g Pesola spring scale. Locality records of other visual sightings and acoustic recordings of Nicaraguan *D. albus* were obtained from Medina-Fitoria et al. (2010) and Medina-Fitoria (2014).

Results

New record. Nicaragua: Río San Juan: Reserva de la Biosfera Sureste de Nicaragua: Reserva Privada Refugio Bartola (10.97239° N, 084.33947° W; 35 m above sea level, datum WGS84), Julio Loza observer, 6 January 2017 (1 individual; Fig. 2).

We photographed 1 adult female *Diclidurus albus* night roosting (21:15 h) ca 7 m above the ground in one of the corridors of the Refugio Bartola Private Reserve (Fig. 2A). The bat remained still for ca 1.5 hours before it was collected with a hand net and morphometric measurements and photographs were obtained (Fig. 2B).

The description of the individual is as follows: female; head and body length = 76 mm; tail length = 21 mm; hind foot length = 11 mm; ear length = 16 mm; forearm length = 67 mm; and weight = 21 g.

Identification. There are only 2 species of white bats in Nicaragua (Reid 2009, Medina-Fitoria 2014): *Ectophylla alba* (family Phyllostomidae), which is small and has a noseleaf, and *Diclidurus albus* (family Emballonuridae), which is characterized by the absence of a noseleaf, long snout (upper lip exceeds in length the lower lip), large eyes, and short, yellowish and rounded ears, which fits perfectly with the description of our individual (Fig. 2).

Figure 2. Adult female *Diclidurus albus* from Refugio Bartola Private Reserve, department of Río San Juan, Nicaragua. A) Night roosting in the ceiling of the hotel corridors. B) Portrait shot of the same individual. Photos: JL.

Discussion

Although *Diclidurus albus* has been considered a member of the Nicaraguan mastofauna since the 19th century (Alston 1879), and there have been visual sightings and acoustic recordings of the species in the country from the departments of Atlántico Sur (7 June 2007 in Bluefields and 12 June 2013 in Cruz de Río Grande), Managua (12 January 2009 in the city of Managua), León (24 February 2013 in the city of León), and Rivas (23 March 2014 in La Fé), the current record represents the first captured and photographed individual of this species from Nicaragua, as well as a new departmental record for Río San Juan (Fig. 3). However, there remains no museum voucher specimen of *D. albus* from Nicaragua (Medina-Fitoria et al. 2010, Medina-Fitoria 2013, 2014).

Diclidurus albus is a peculiar, characteristic, and rarely encountered bat species listed as a species of Least Concern under the IUCN (International Union for Conservation of Nature) Red List of Threatened Species categories, where no major threats to this widespread species have been reported (Lim et al. 2016). Because of its foraging habits, it is rarely caught using mist nets (Ceballos and Medellín 1988, Reid 2009). In addition, *D. albus* has highly variable calls, which makes it difficult to identify it from other emballonurid bats from acoustic recordings (Jung et al. 2007, Arias-Aguilar et al. 2018). Although this species is expected to occur across Nicaragua, sampling limitations associated with acoustic identification and physical detection may explain why its distribution has been historically underestimated in the country (Medina-Fitoria 2014; see Fig. 3). Further sampling in Nicaragua will likely fill in gaps in the species distribution throughout the country.

We suspect this opportunistic finding in a building could be a consequence of the extreme disturbance of the surrounding forest of Refugio Bartola caused by hurricane Otto in late November 2016 (Brown 2017), resulting in presumable lack of available roosts.

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Authors' Contributions

JL took the photographs and the morphometric data, FAR identified the specimen, JS and JGMF wrote the text and elaborated the map. All authors read and approved the final manuscript.

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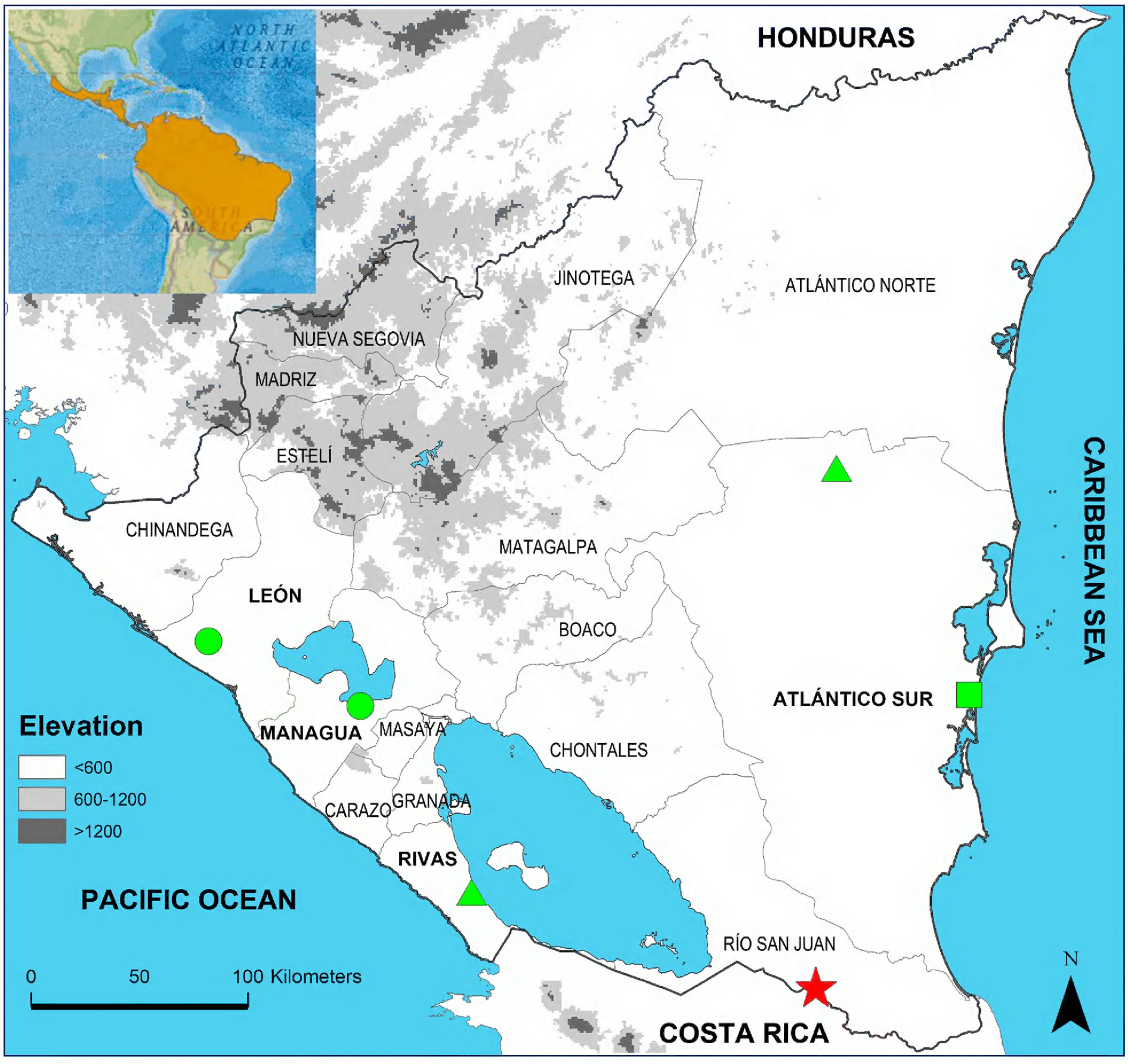

Figure 3. Map of Nicaragua showing the localities where *Diclidurus albus* has been recorded. Green localities corresponds to historical records: both visual sightings and acoustic recordings (circles), only acoustic recordings (triangles), and only visual sightings (square). The red star corresponds to the new captured individual recorded herein. The upper left inset corresponds to the general distribution map of the species (Lim et al. 2016).

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